

KSC-SPEC-E-0012
April 1, 1968
Supersedes 75M12110D



**JOHN F. KENNEDY
SPACE CENTER**

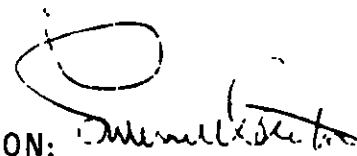
**HEAT AND BLAST PROTECTION
COATING MATERIALS FOR ELECTRICAL CABLES,
SPECIFICATION FOR**

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JOHN F. KENNEDY SPACE CENTER, NASA

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SPECIFICATION FOR

AUTHENTICATION:



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Director of Design Engineering

JOHN F. KENNEDY SPACE CENTER, NASA
HEAT AND BLAST PROTECTION
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SPECIFICATION FOR

This specification has been approved by the Design Engineering Directorate of the John F. Kennedy Space Center (KSC) and is mandatory for use by KSC and associated contractors.

1. SCOPE

1.1 Scope. - This specification covers general requirements for heat and blast protection coating materials for launch support equipment electrical cables.

1.2 Classification. - Materials furnished under this specification shall be one of the classes as specified in KSC-SPEC-F-0006.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids or requests for proposal form a part of this specification to the extent specified herein.

SPECIFICATIONS

Military

Hydraulic Fluid, Petroleum Base,
Aircraft, Missile, and Ordnance

MIL-H-5606

John F. Kennedy Space Center

KSC-SPEC-F-0006
and its applicable
documents

Heat and Blast Protection
Coating Materials,
Specifications For

George C. Marshall Space Flight Center

MSFC-SPEC-106

Testing Compatibility of Materials
for Liquid Oxygen Systems

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STANDARDS

Military

MIL-STD-129

Marking for Shipment and Storage

PUBLICATIONS

National Aeronautics and Space Administration

NPC 200-3

Inspection System Provisions for
Suppliers of Space Materials,
Parts, Components, and Services

(Copies of specifications, standards, drawings, and publications required by the contractor in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other Publications. - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of invitation for bids shall apply.

American Society for Testing Materials (ASTM) Standard

ASTM D412

Tension Testing of Vulcanized Rubber

3. REQUIREMENTS

3.1 Qualifications. - Material supplied under this specification shall have been tested and have passed the qualification tests described in 4.3 for the class specified. Certification that material furnished under this specification meets the requirements of the specification shall be furnished with each batch of material supplied.

3.2 Multicomponent Systems. - Multicomponent systems shall meet requirements of KSC-SPEC-F-0006.

3.3 Shelf Life. - Shelf life shall meet requirements of KSC-SPEC-F-0006.

3.4 Ease of Application. - Ease of application shall meet requirements of KSC-SPEC-F-0006.

3.5 Adhesion. - Adhesion shall meet requirements of KSC-SPEC-F-0006 and the following.

3.5.1 Coating Material to Polychloroprene. - The adhesion bond strength of coating material to polychloroprene shall be 4 pounds per inch (ppi) minimum after cure. The polychloroprene shall be cleaned and primed in accordance with the coating material manufacturer's instructions.

3.5.2 Multilayer Coatings. - The adhesion bond strength between any two layers of coating material shall be a minimum of 7 ppi after cure. The adhesive agent shall be a liquid or plastic of the same chemical formation as the coating materials so that it blends with them.

3.6 Cure. - The coating material shall become tack free at room temperature within 4 hours after application and shall completely cure by 72 hours.

3.7 Resistance to Penetration by Hydraulic Oil. - Resistance to penetration by hydraulic oil shall meet requirements of KSC-SPEC-F-0006.

3.8 Rocket Engine Exhaust Resistance. - Rocket engine exhaust resistance shall meet requirements of KSC-SPEC-F-0006.

3.9 Refurbishment. - Refurbishment shall meet requirements of KSC-SPEC-F-0006.

3.10 LOX Impact Sensitivity. - Liquid Oxygen (LOX) Impact Sensitivity shall meet requirements of KSC-SPEC-F-0006.

3.11 Weathering. - Weathering shall meet requirements of KSC-SPEC-F-0006.

3.12 Product Identification. - Product identification shall meet requirements of KSC-SPEC-F-0006.

3.13 Flexibility. - Material must not separate or crack when cable with cured coating is bent into a loop which has an inside diameter as shown in the table 1.

Table I. Cable Bend Radii

Cable Diameter	Loop Diameter
Less than 1 inch	10 \pm 1 times cable diameter
1 inch to 1.5 inches	16 \pm 1 times cable diameter
Over 1.5 inches	20 \pm 1 times cable diameter

3.14 Resistivity to Bending. - The bending force of a cable coated with 1/8 inch of this coating material shall not exceed the bending force of the uncoated cable by more than 50 percent at room temperature.

3.15 Tensile Strength. - The coating material shall exhibit a tensile strength of 300 pounds per square inch (psi) or greater.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility. - Responsibility as specified in KSC-SPEC-F-0006 shall be applicable to this specification.

4.2 Quality Control. - Quality control as specified in KSC-SPEC-F-0006 shall be applicable to this specification.

4.3 Qualification Testing. - To become a qualified product, material shall meet the requirements of section 3 of this specification and pass the qualification tests of KSC-SPEC-F-0006 and the following:

- a. Adhesion tests (see 4.6.1).
- b. Resistivity to Bending test (see 4.6.2).
- c. Tensile Strength tests (see 4.6.3).

4.4 Acceptance Testing. - Acceptance testing shall be as specified in KSC-SPEC-F-0006.

4.5 Test Conditions.

4.5.1 Standard Conditions. - Standard conditions shall be as specified in KSC-SPEC-F-0006.

4.5.2 Test Specimen Preparation. - Prepare per KSC-SPEC-F-0006 as applicable. Additional specimens required by this specification shall be prepared in accordance with manufacturers recommendations.

4.6 Test Methods. - Test methods shall be as specified in paragraphs 4.6.1 through 4.6.3 and KSC-SPEC-F-0006.

4.6.1 Adhesion Test.

4.6.1.1 Coating Material to Polychloroprene. - Prepare three specimens by abrading strips of polychloroprene sheath material, 1.5 inches by 8.0 inches minimum, and prime the surface as recommended by the coating material manufacturer. Apply a 0.125 plus or minus 0.030 inch thick coating to the sheath surface. After curing, a strip of the coating material 1 plus or minus 1/16 inch by approximately 5 inches shall be cut from the specimens and be stripped from the polychloroprene by an apparatus with a jaw separation rate of 12 inches per minute. The bond strength shall be as specified in paragraph 3.5.1.

4.6.1.2 Multilayer Coatings. - Prepare three specimens by bonding together two strips of cured coating material, 1 plus or minus 1/16 inch by approximately 6 inches by 0.125 plus or minus 0.030 inches. Uncured coating material shall be used for bonding agent. The specimens shall be pulled apart in an apparatus with a jaw separation rate of 12 inches per minute. The bond strength shall be as specified in paragraph 3.5.2.

4.6.2 Resistivity to Bending. - A specimen of coated cable shall be clamped in a fixture so that a length of cable equal to (12 times cable diameter) plus or minus 1/4 inch is flexed through an arc of 55 plus or minus 5 degrees. The bending force shall be as specified in paragraph 3.14.

4.6.3 Tensile Strength. - The cured material shall be tested in accordance with ASTM D412. The tensile strength shall be as specified in paragraph 3.15.

5. PREPARATION FOR DELIVERY

5.1 Preparation for Delivery. - Requirements to be specified in the procurement document.

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6.1 Ordering Data. - Procurement documents should specify:

- a. Title, number, and date of this specification.
- b. Classification (see 1.2).

6.2 Special Requirements. - Special applications may require that the coating material retain its thermal protection characteristics after exposure to certain chemicals such as RP-1, freon, acetone, 50:50 UDMH-Hydrazine blend and nitrogen tetroxide. When required, the procuring activity will specify the special requirement in procurement documents and will conduct the required tests to determine acceptability.

Notice. - When KSC drawings, specifications, or other data are used for any purpose other than in connection with a definitely related KSC procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever and the fact that KSC may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian:

NASA-John F. Kennedy
Space Center

Preparing activity:

John F. Kennedy Space Center
Design Engineering
Directorate